Off-Axis Calibration System

I. Hardware

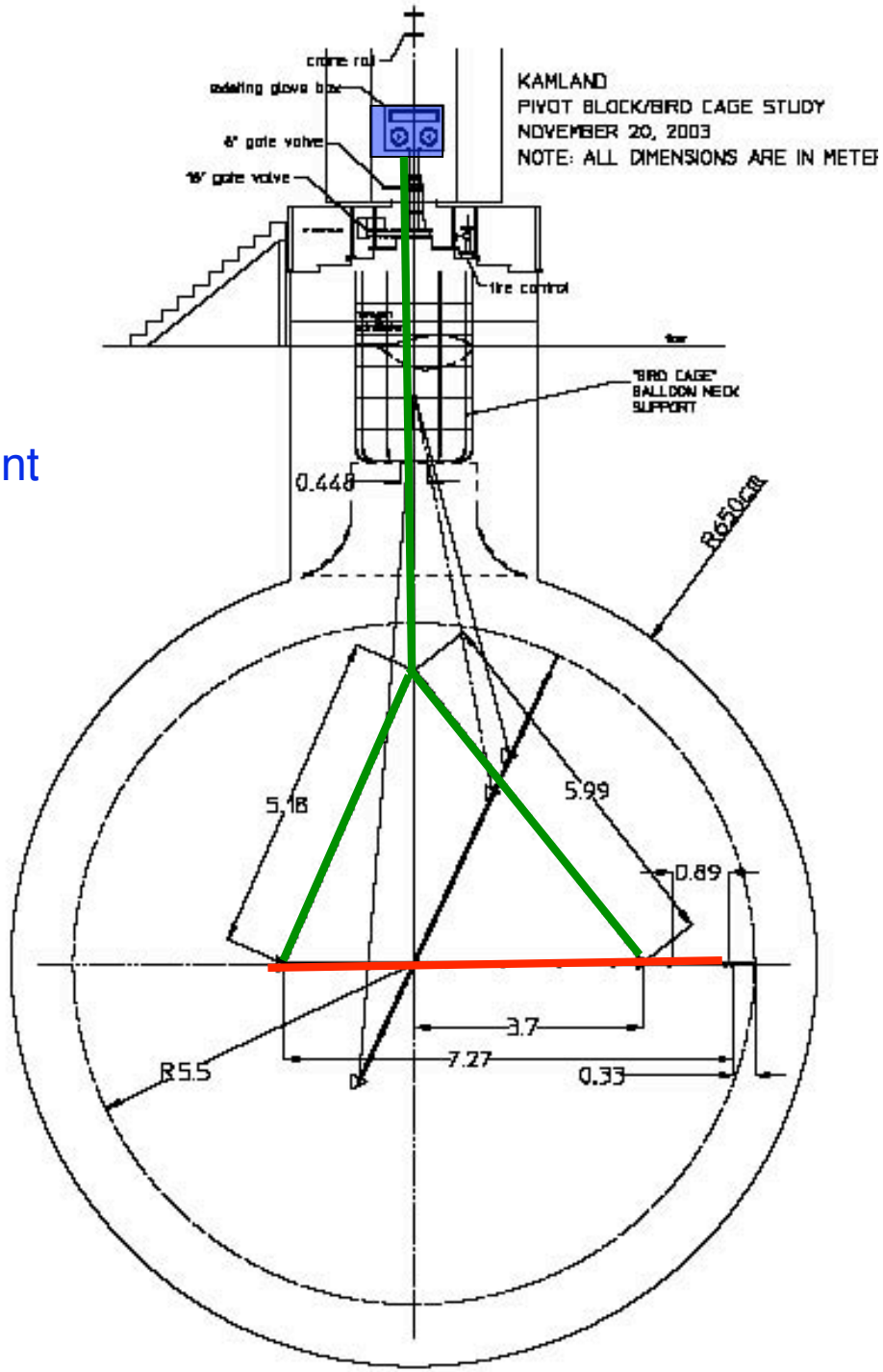
Glovebox System and Deployment Hardware

Control Cable + Pivot Block

Calibration Pole

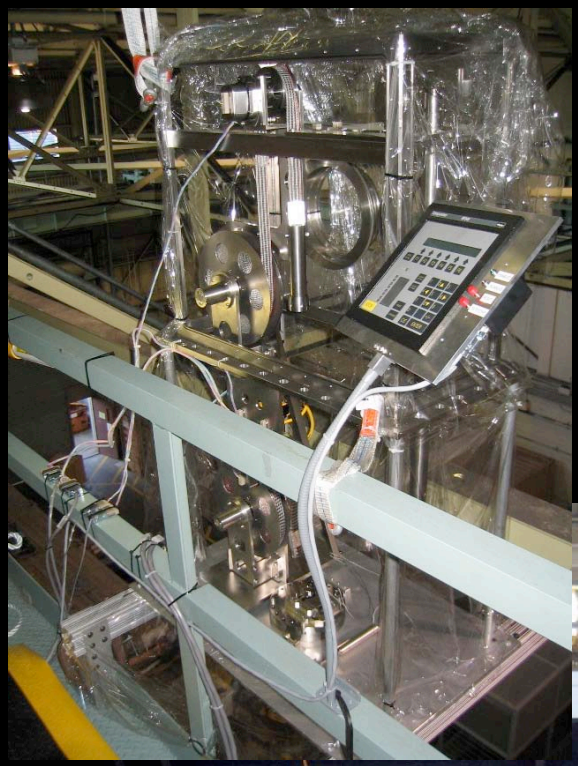
II. System Control Software

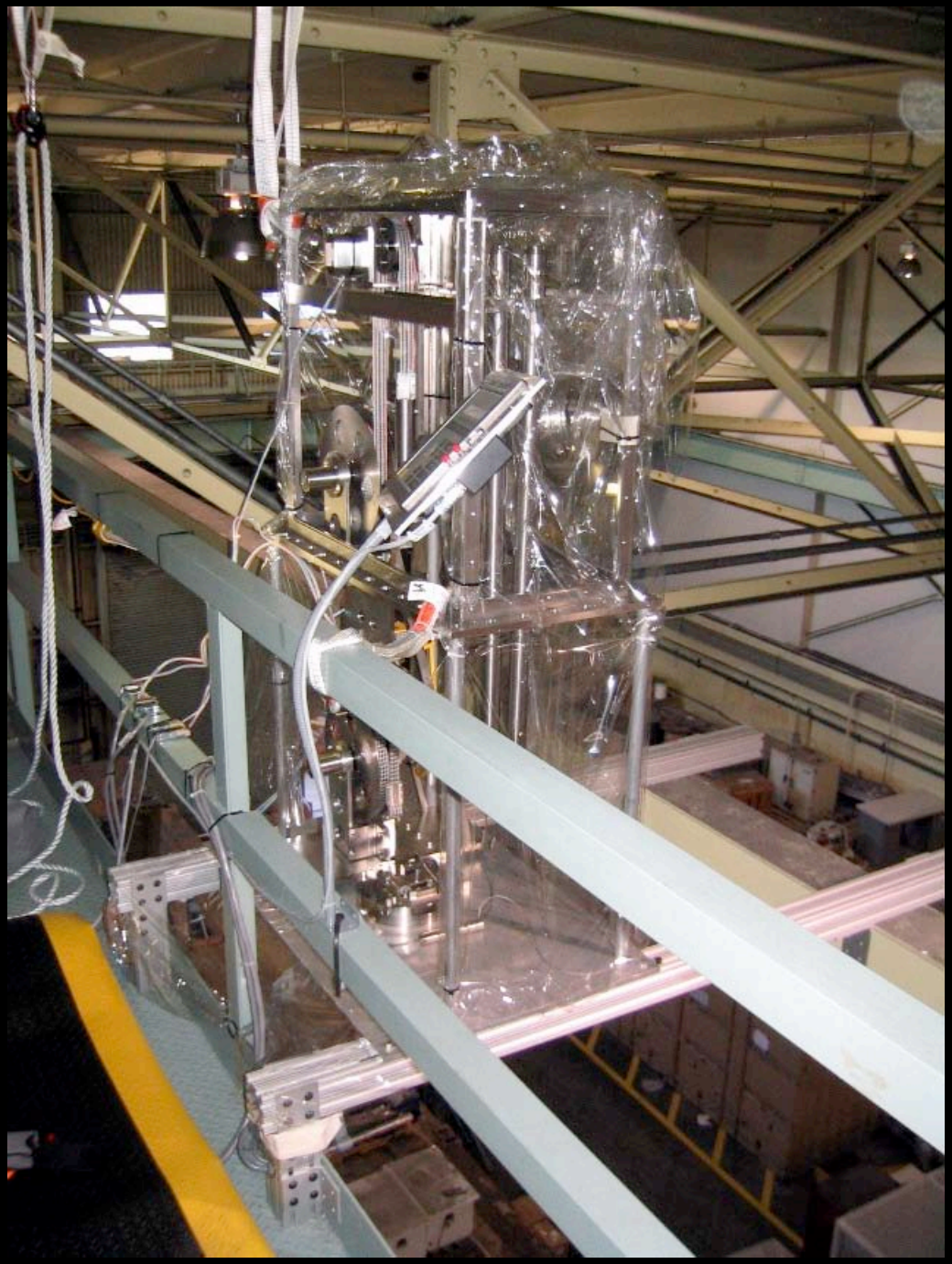
III. Position Reconstruction

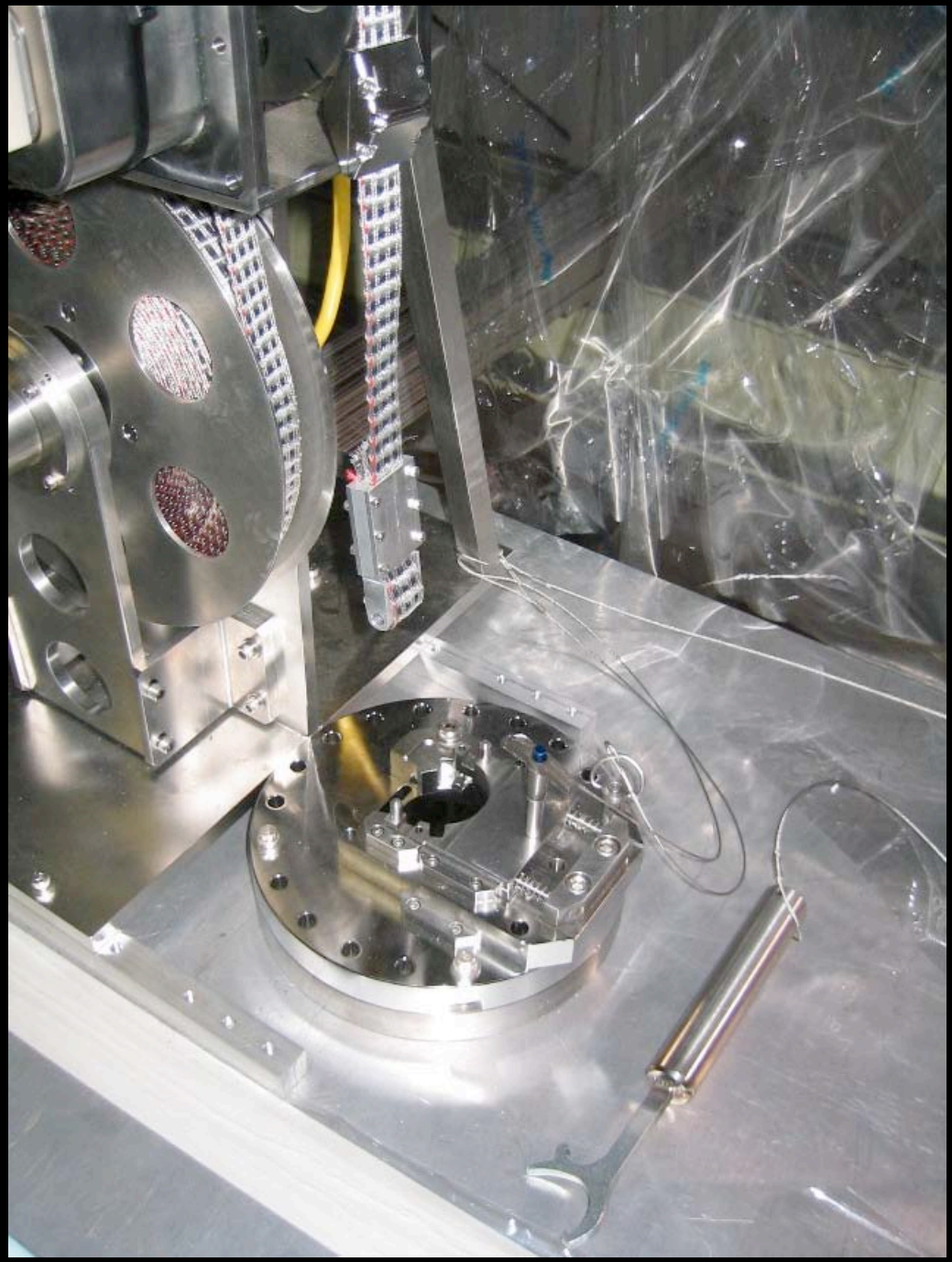


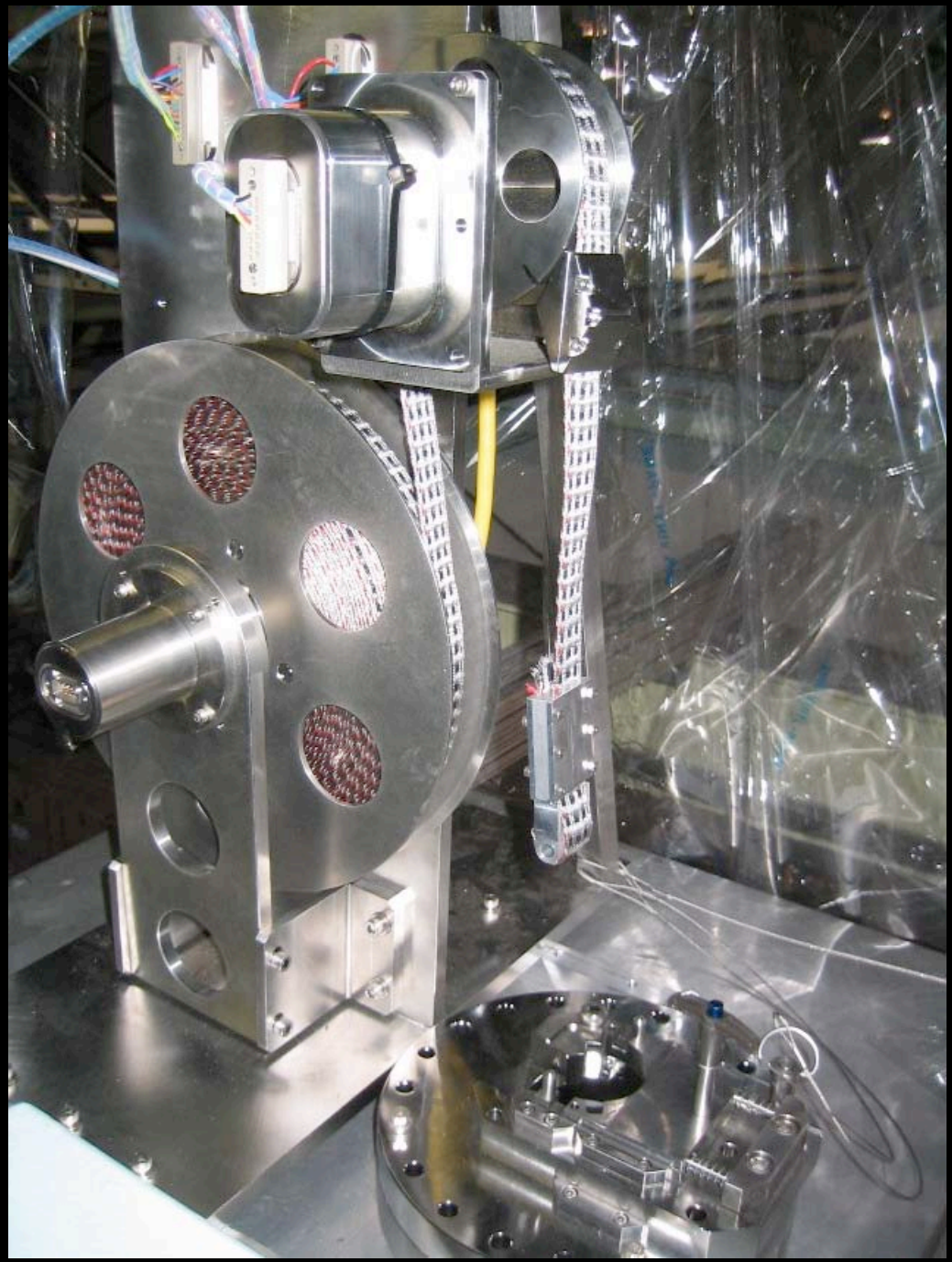
March 1, 2003
The “coat hanger” idea

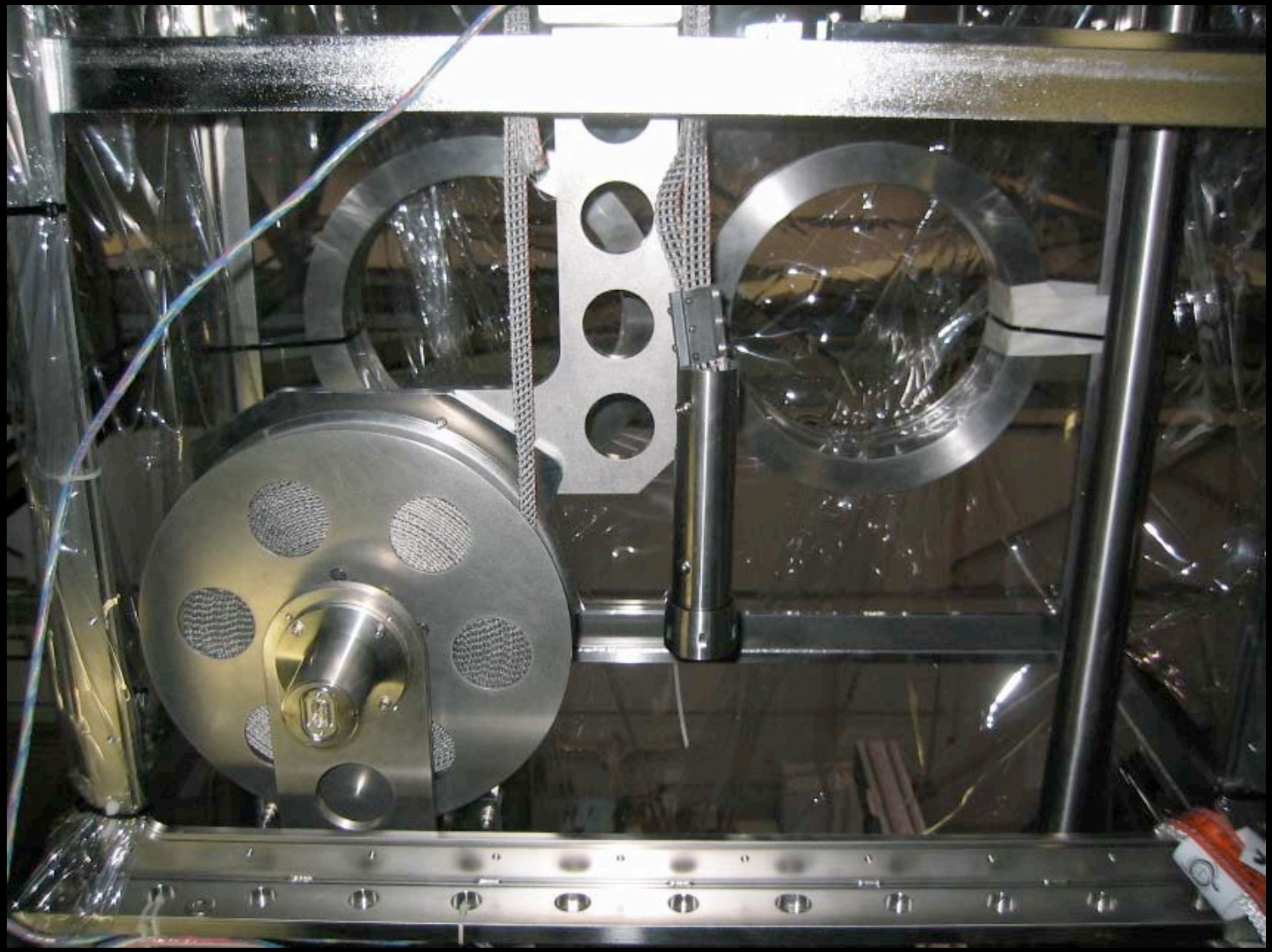
September 16, 2004
Full test of deployment system

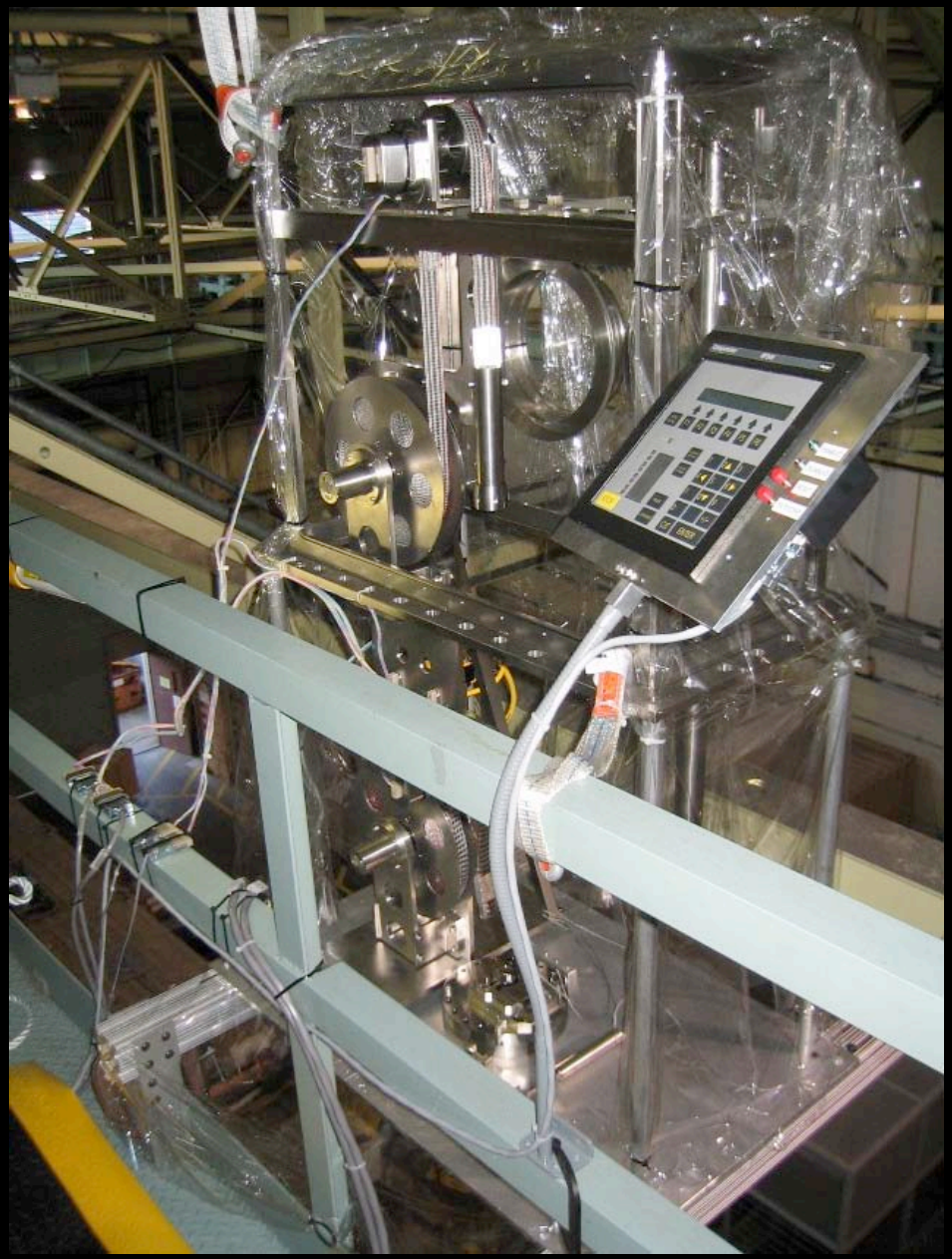


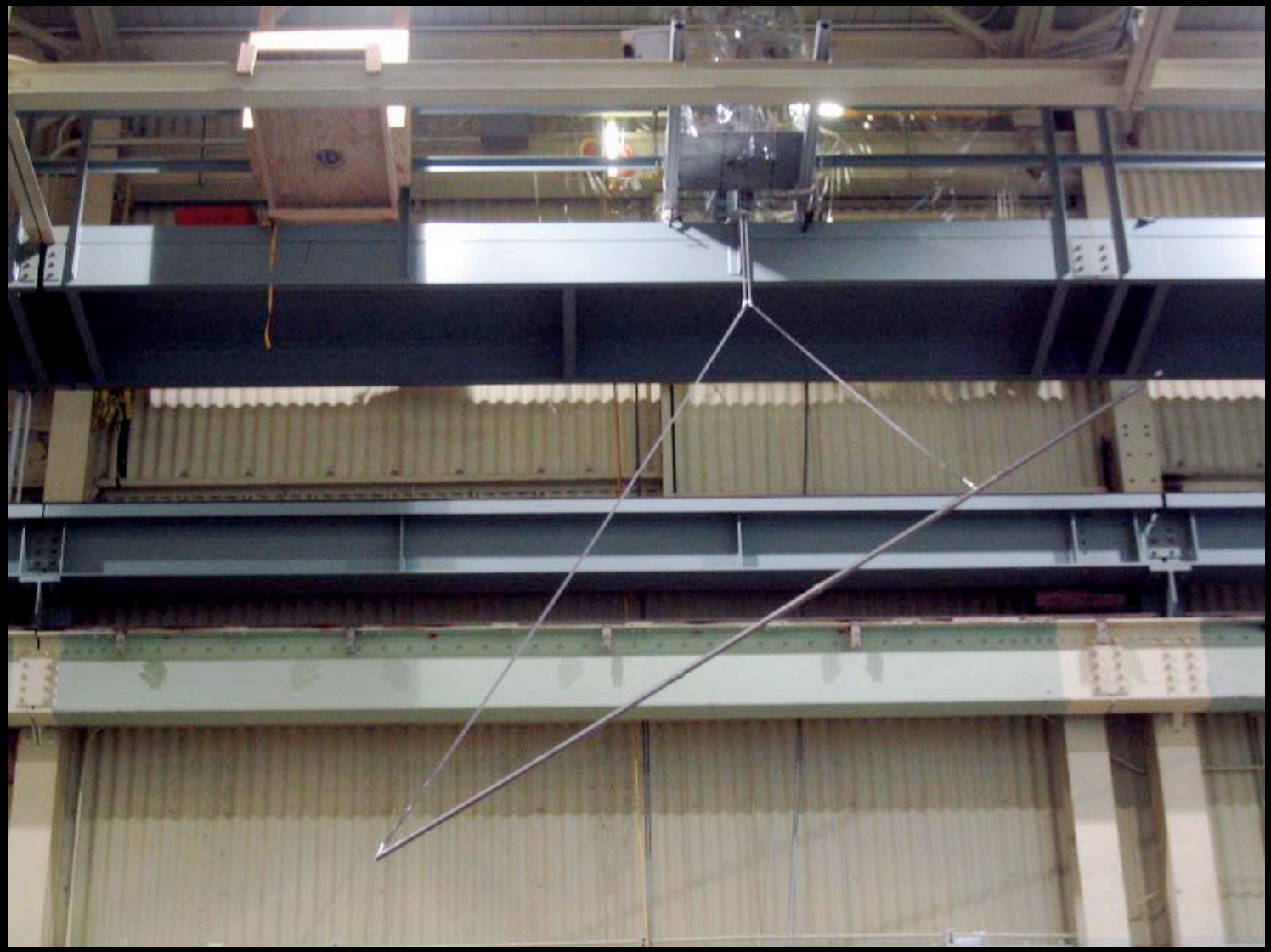




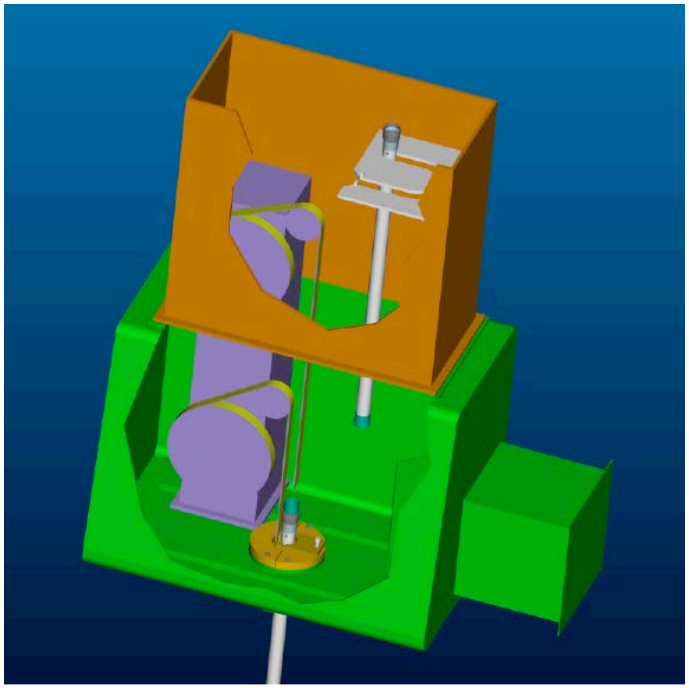


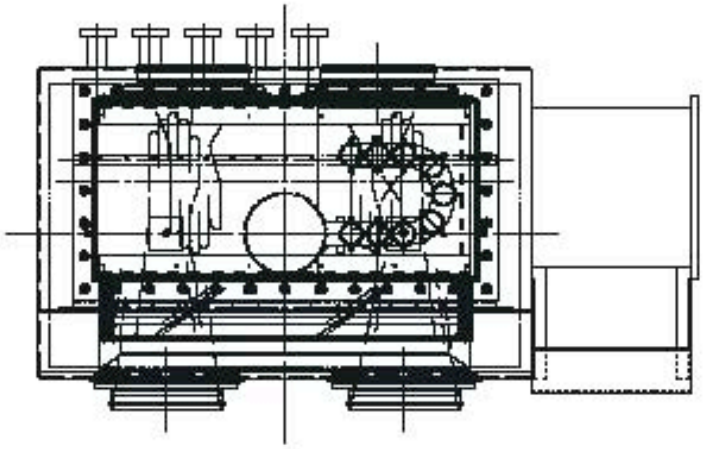




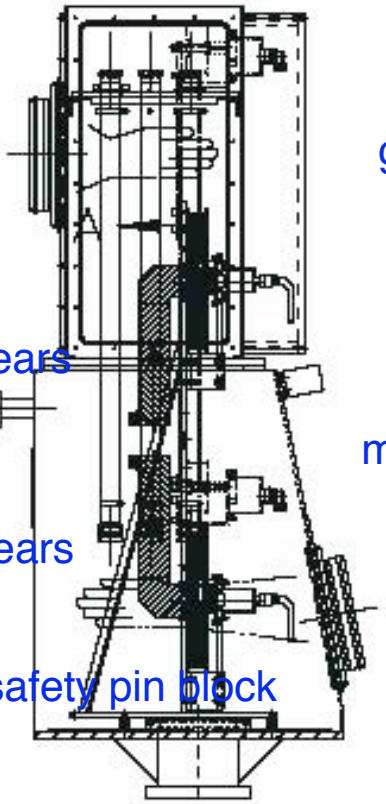


Glovebox System and Deployment Hardware





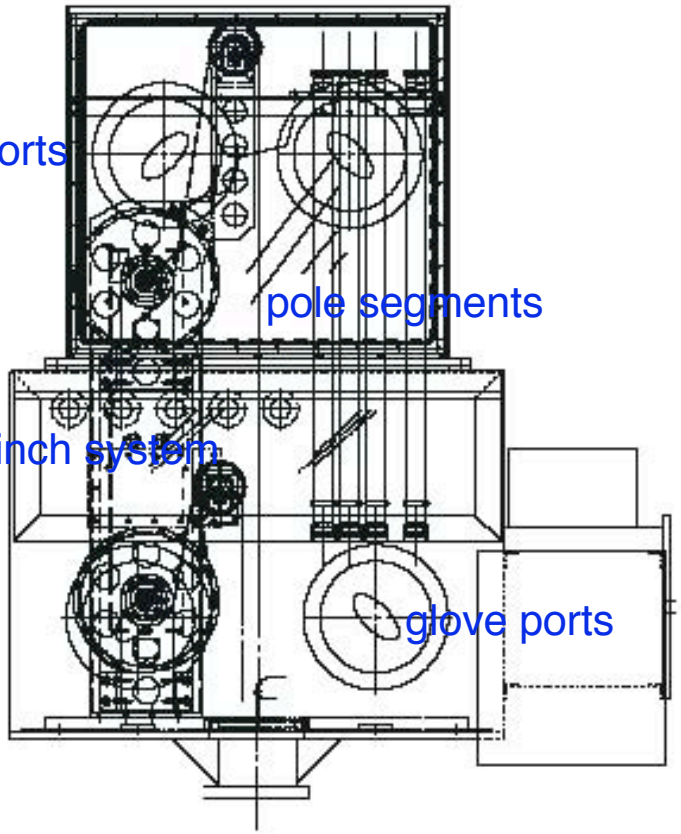
glovebox extension - penthouse



motors + gears

motors + gears

safety pin block



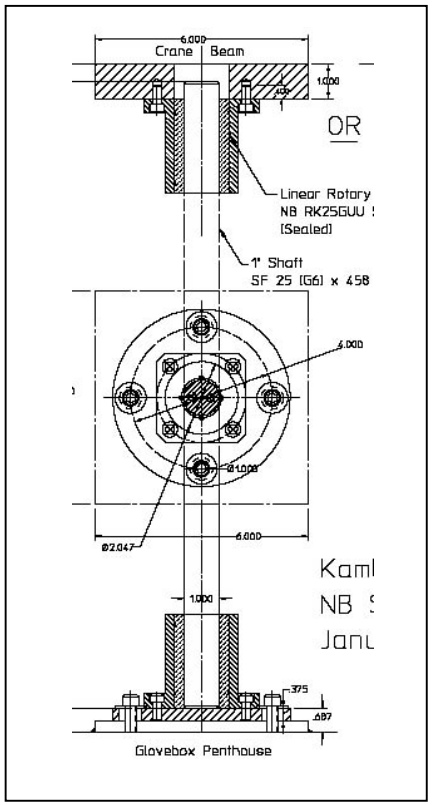
glove ports

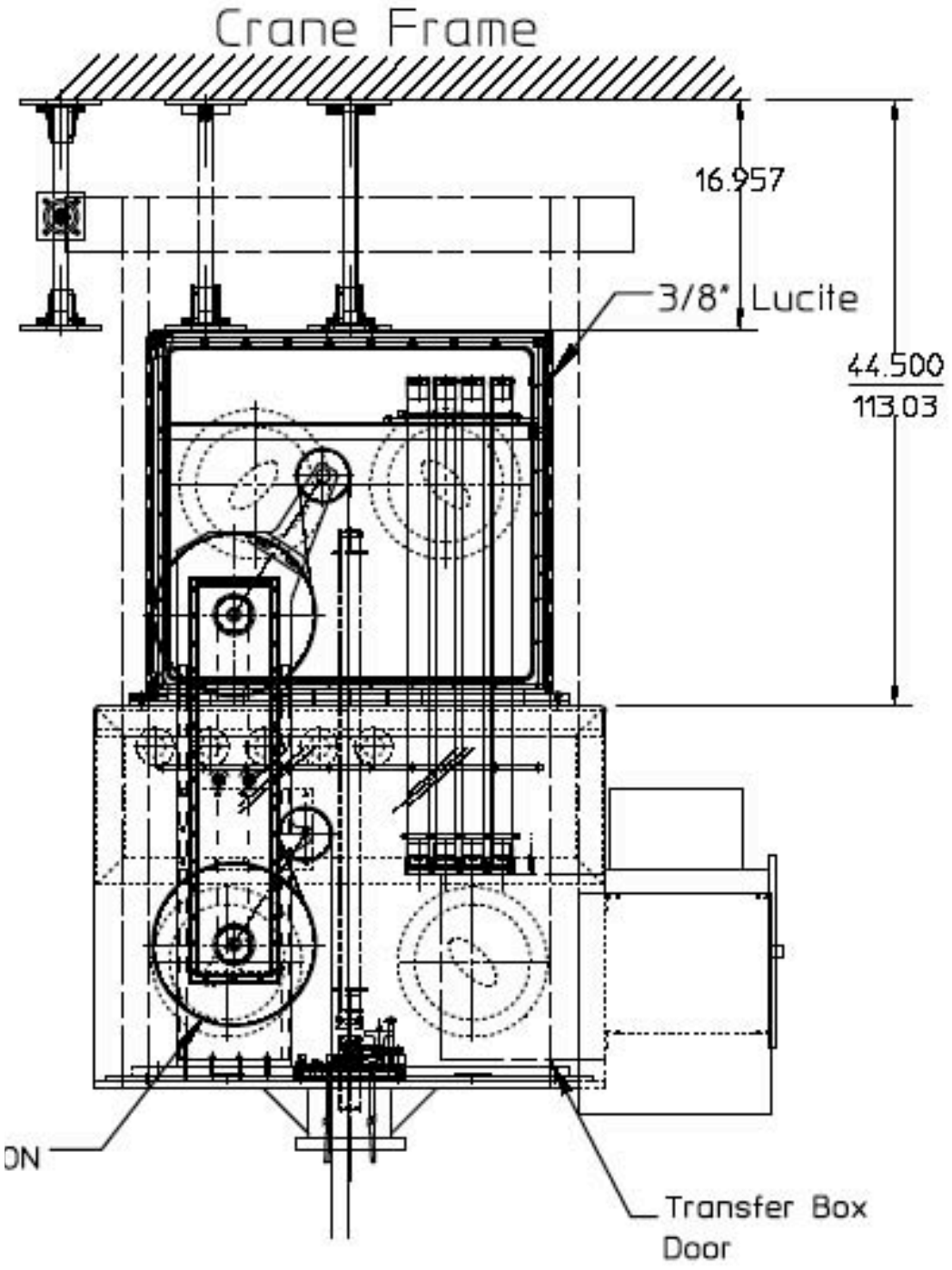
pole segments

motor winch system

glove ports

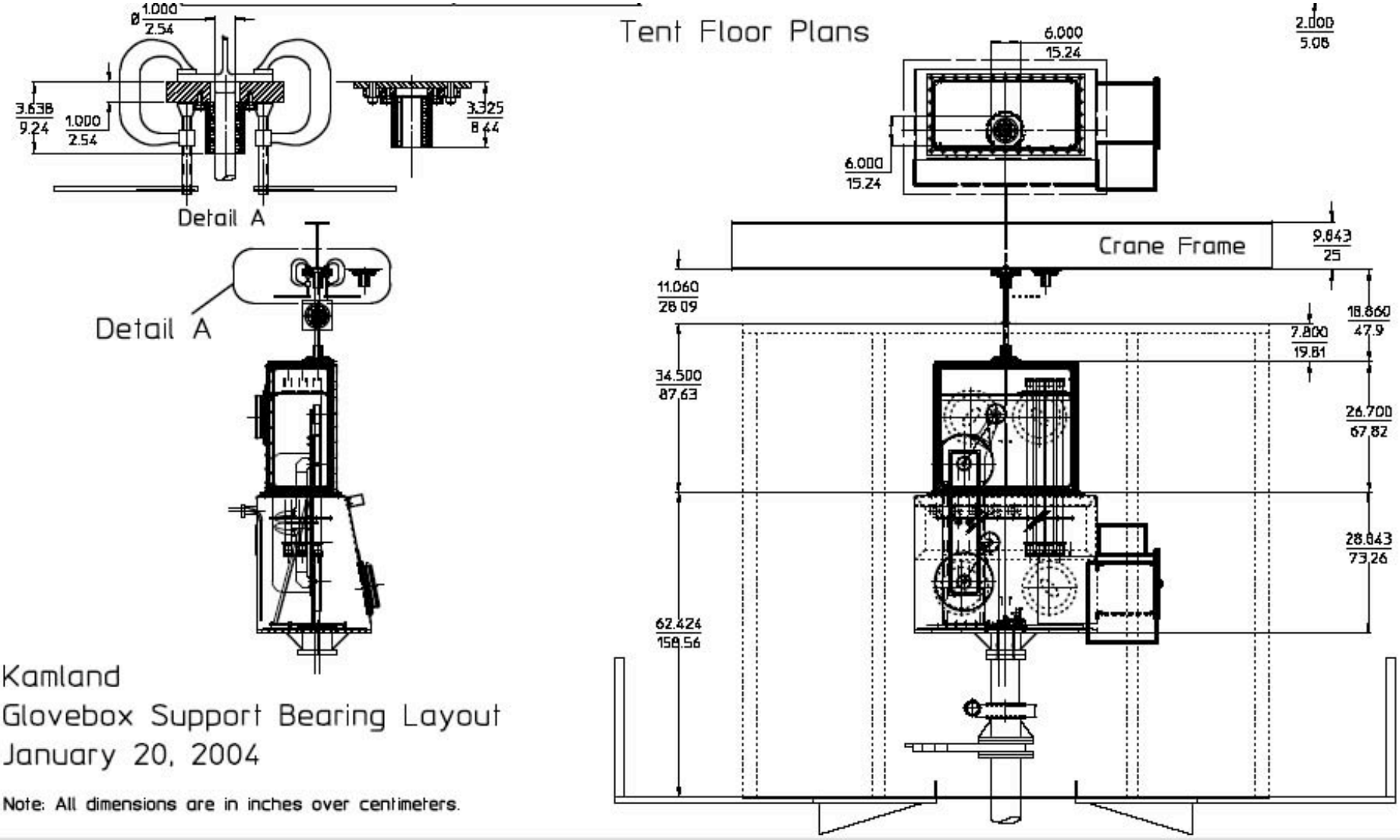
Glovebox Axial Support



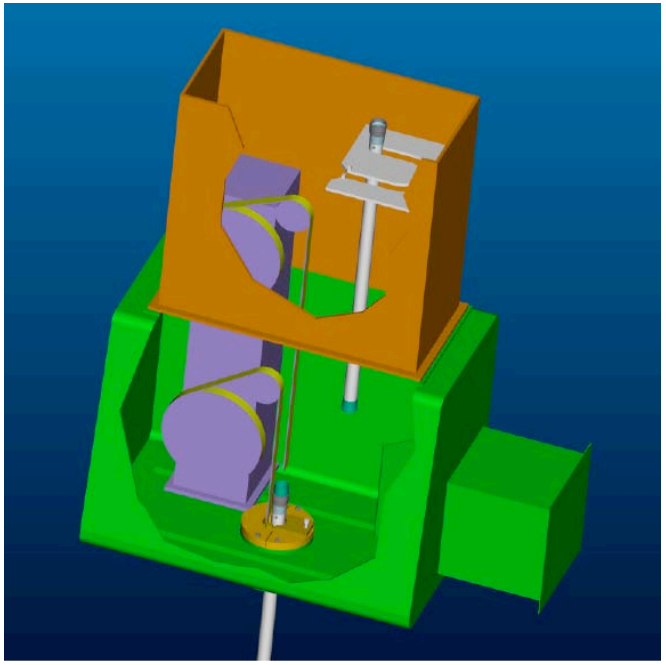


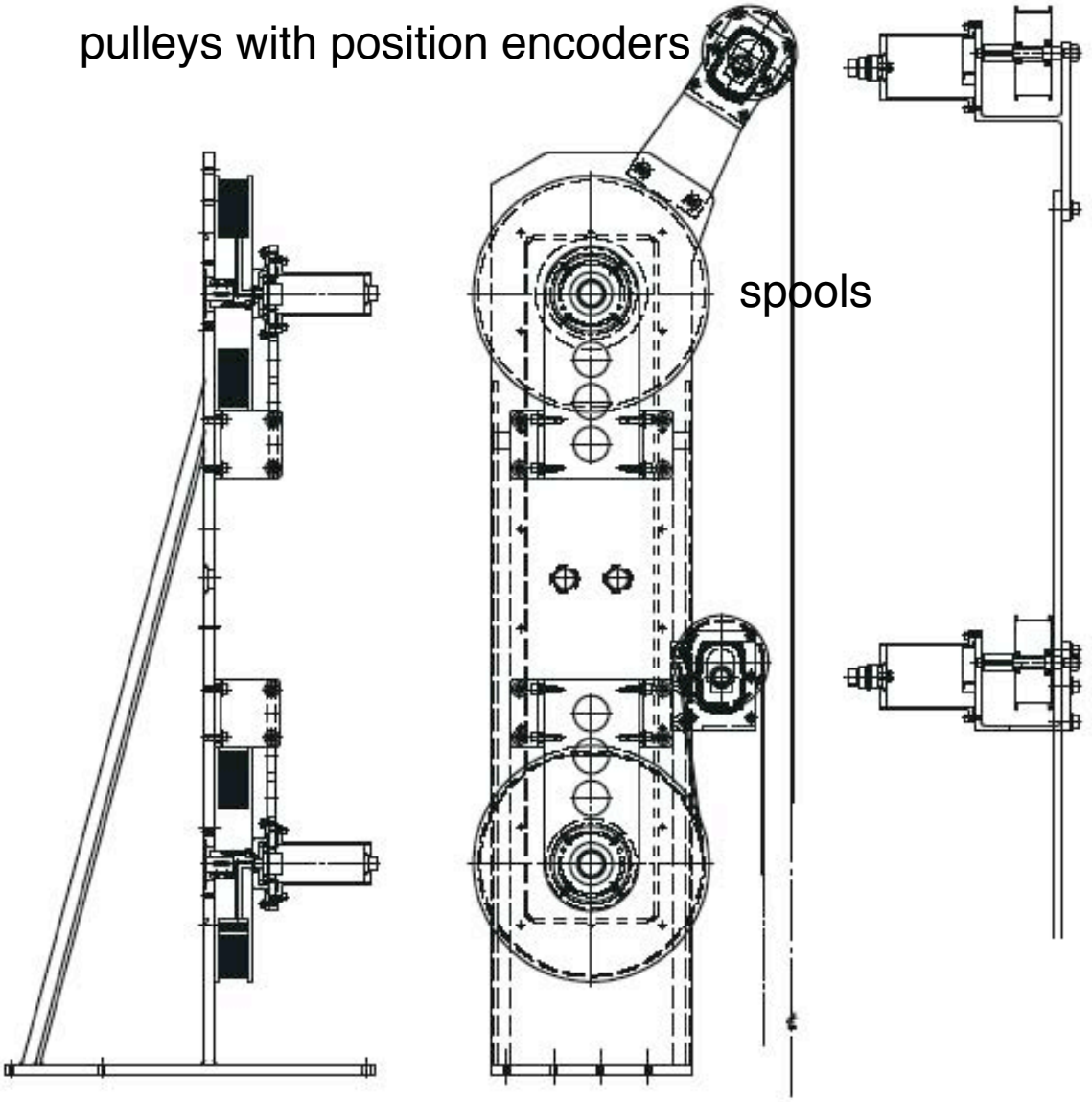
- provides axial stability
- allows system to rotate
- avoids future problems with rotary stage

Glovebox Axial Support

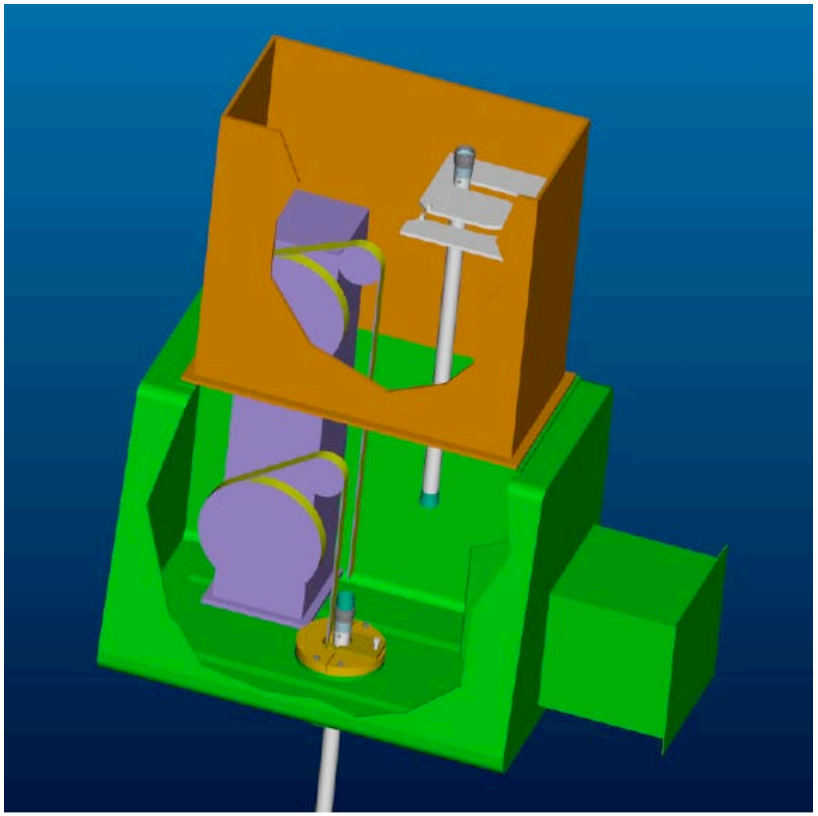


Motor Drive System

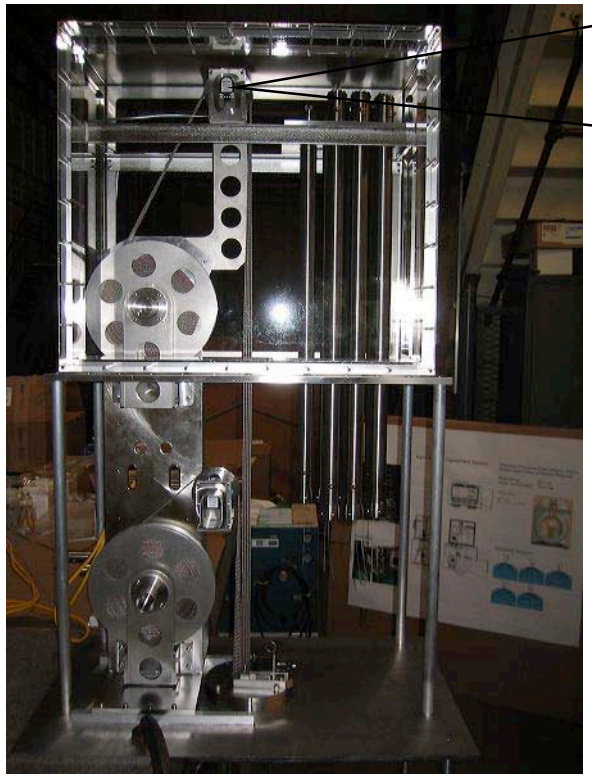


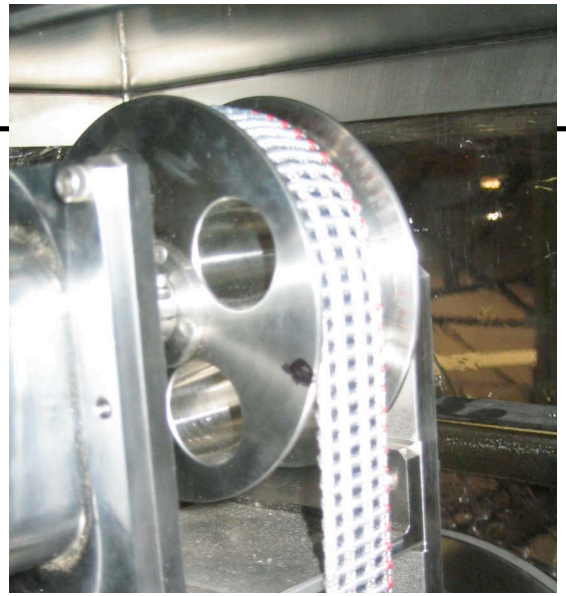


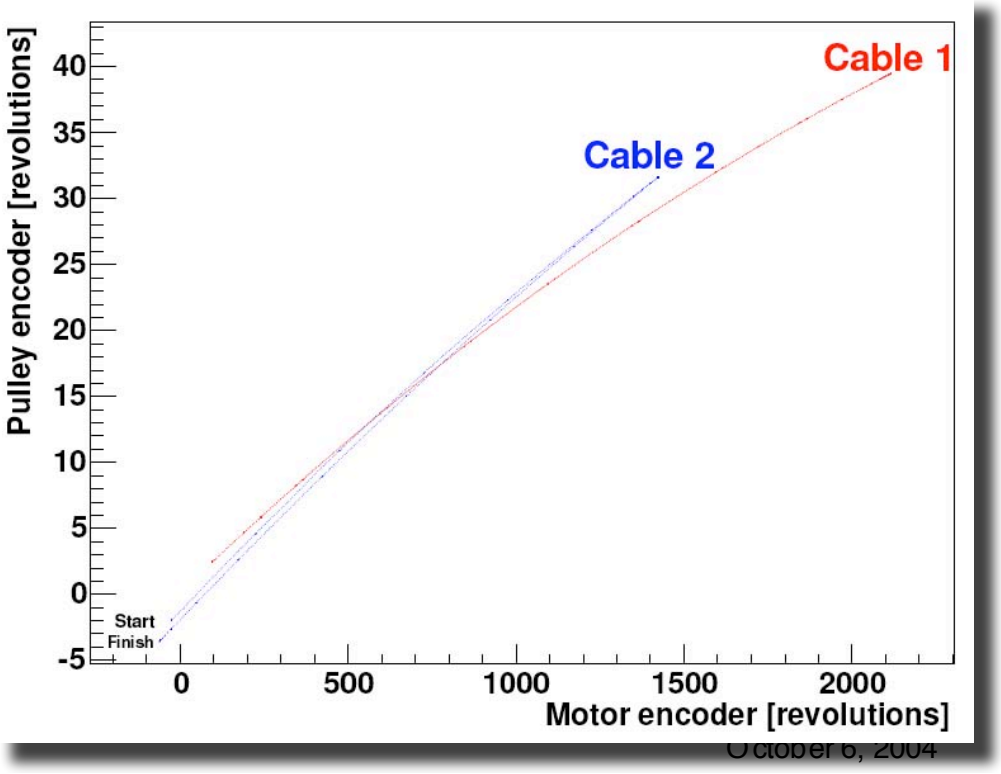
Glovebox System and Deployment Hardware



Encoder and Guide Pulleys



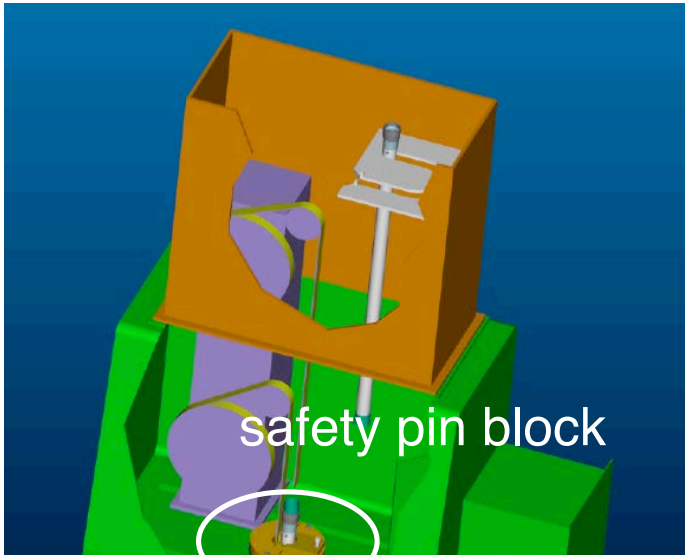




- cable 1 behaves as expected
- accuracy of encoder pulleys: < 0.5 cm
- curve fits well the cable length on spool

- cable 2 not used as much, memory effect from fabrication

Safety Pin Block

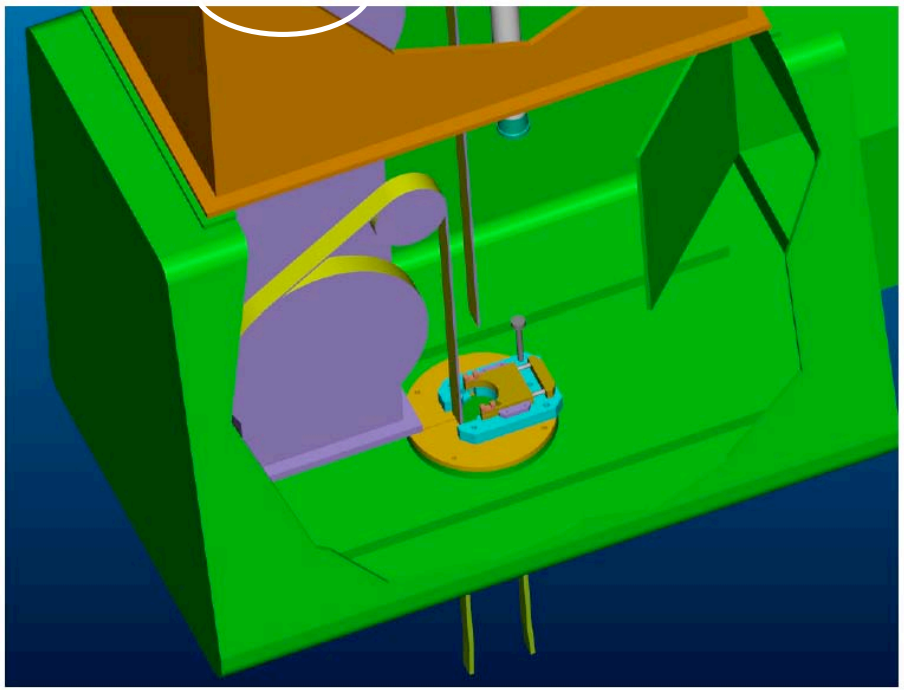


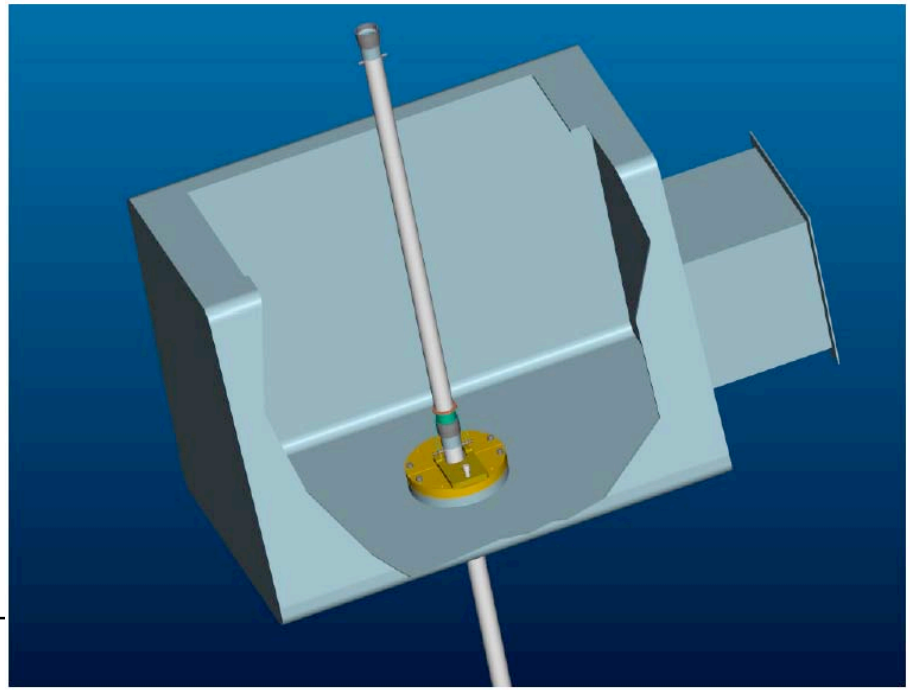
Purpose

I. Safety block between glovebox and detector.

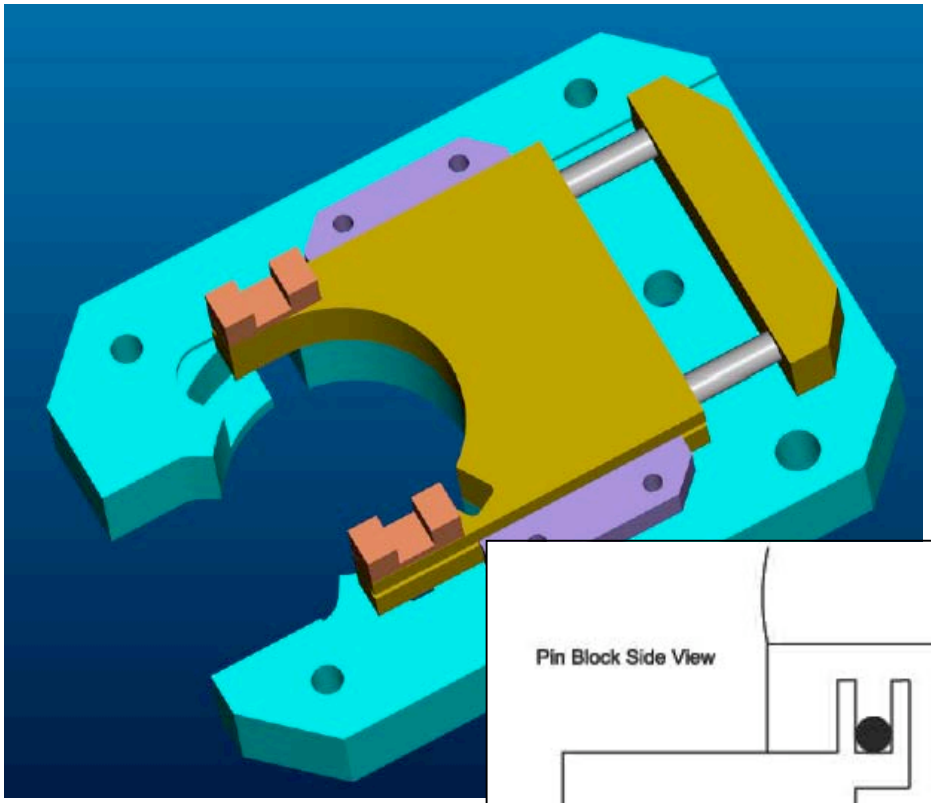
II. Used for assembly of pole.

III. Allows easy retrieval of pole.





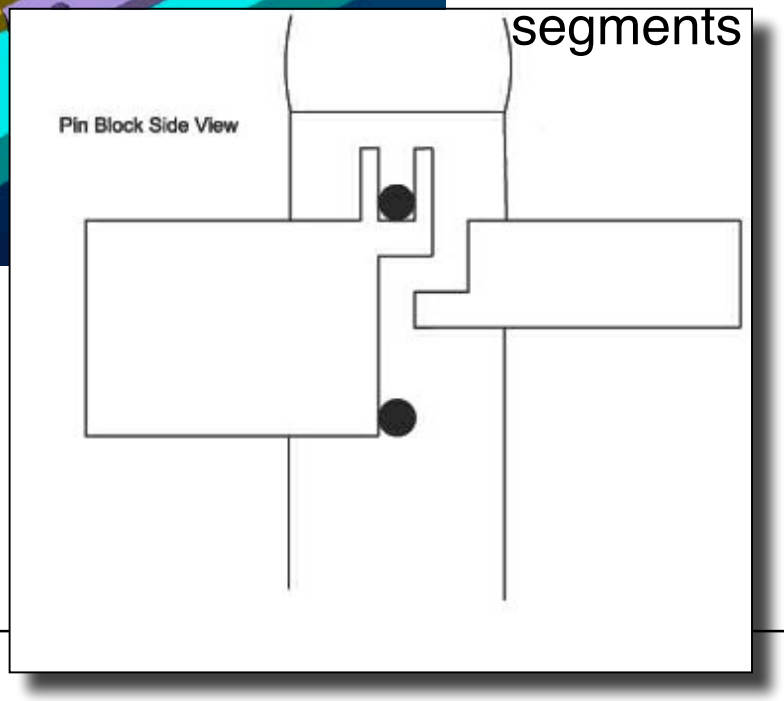
Safety Pin Block



1. prevents pole segments from dropping into detector

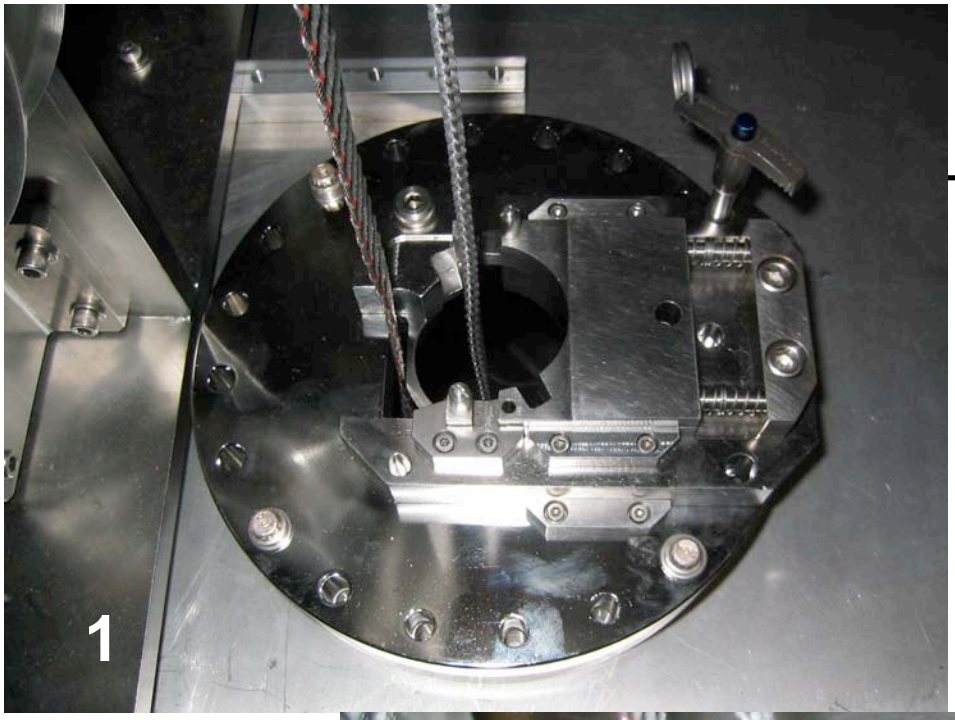
2. operator needs to turn pole segment when engaged in safety pin block

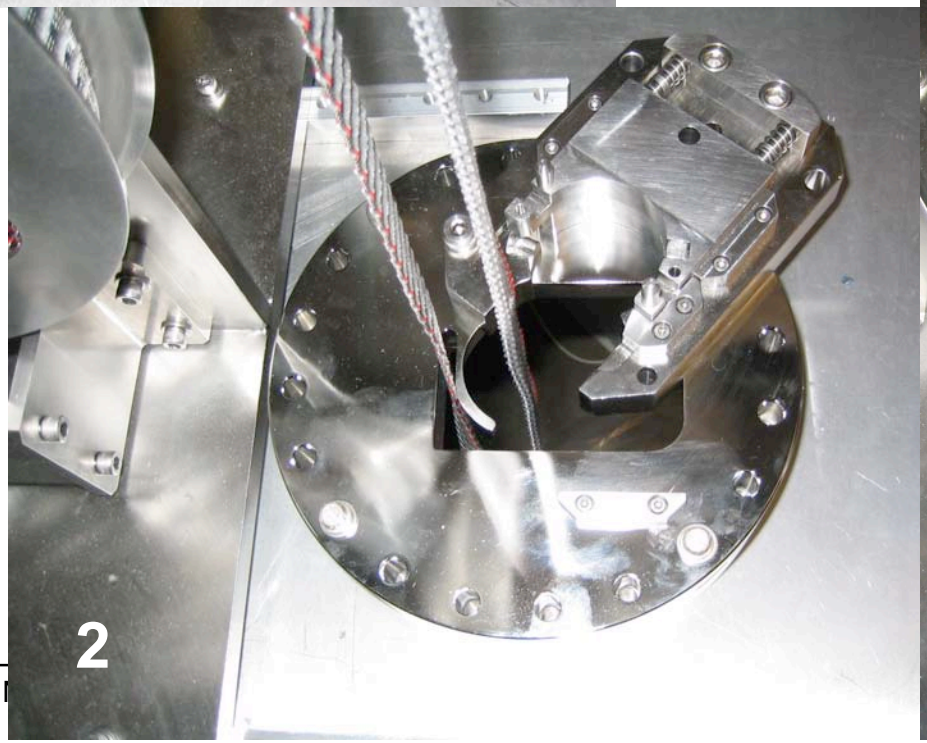
3. sliding block allows easy retrieval of calibration pole segments

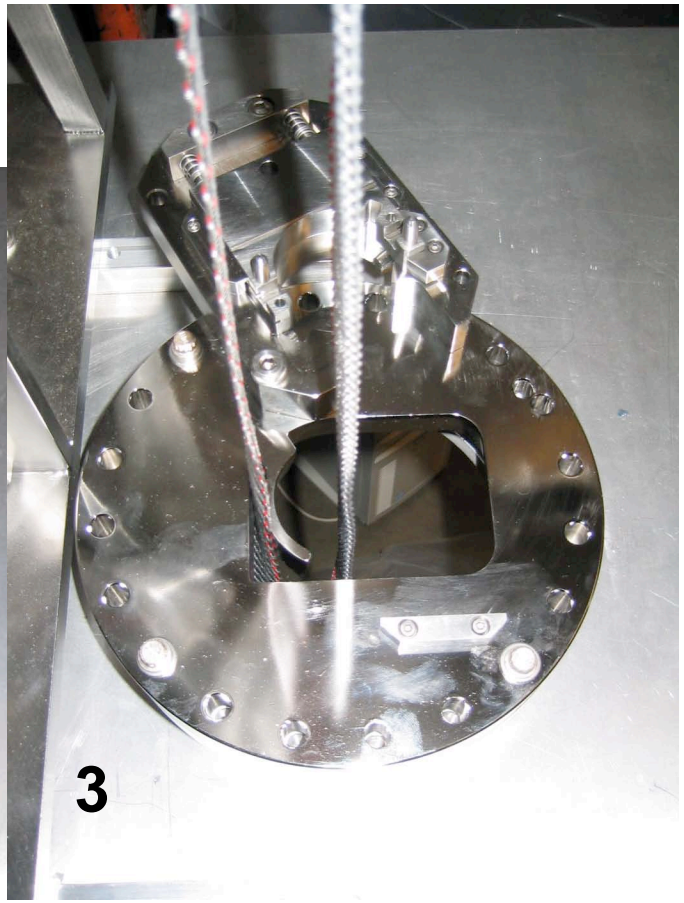


The New Pin Block

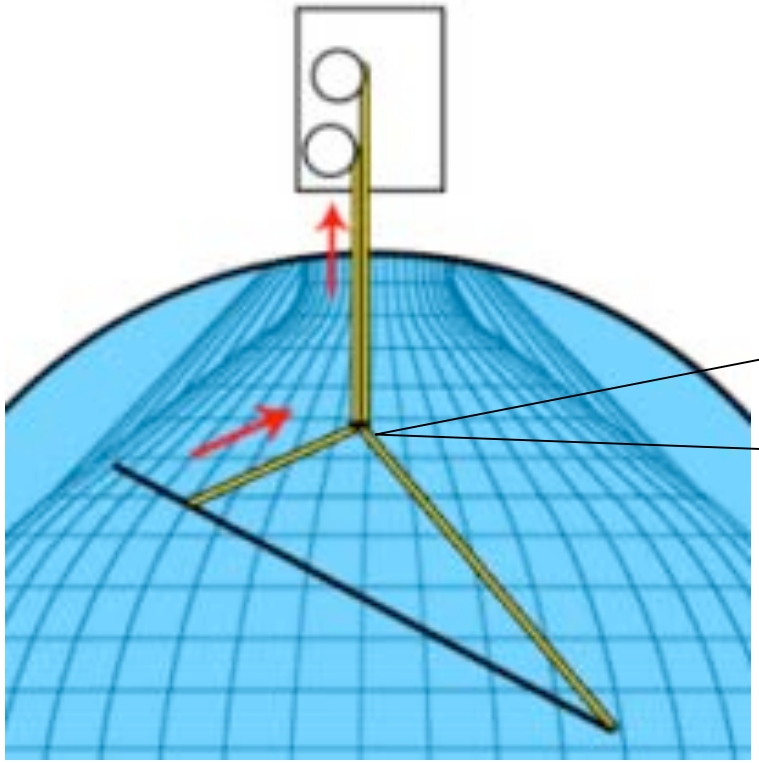
- mounted on conflat flange
- guides control cables
- rotates to allow pivot block to pass
- provides 3-step safety lock





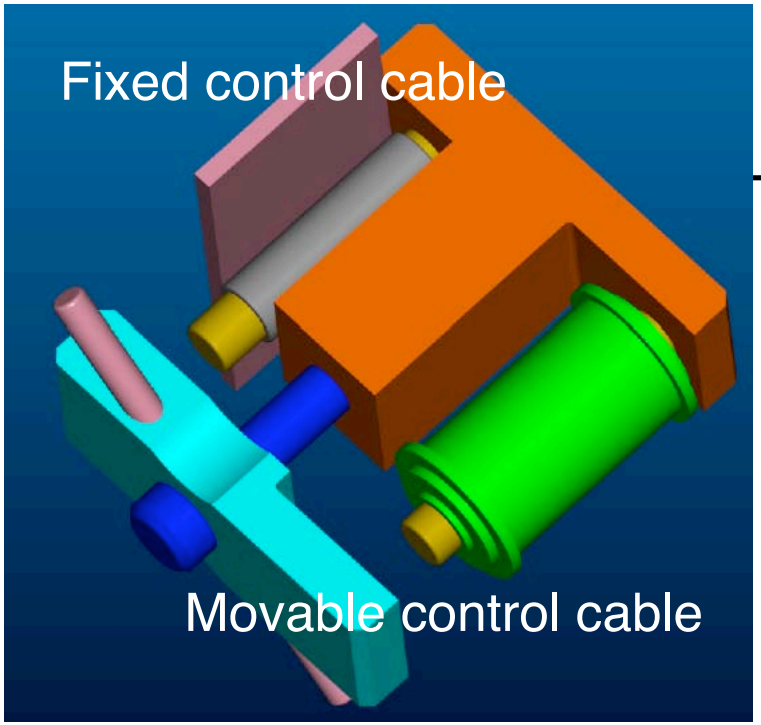


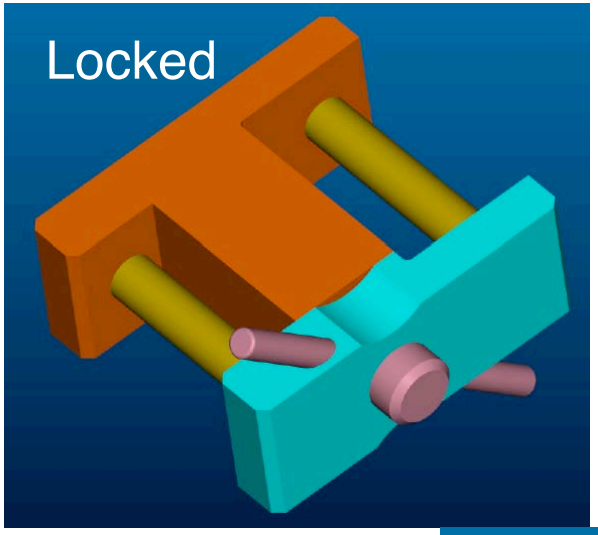
Pivot Block

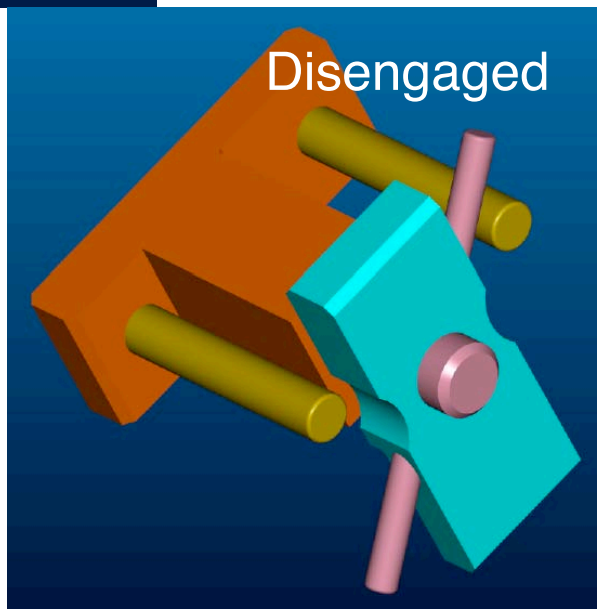


An essential part to control motion of system

Pivot Block - Functionality

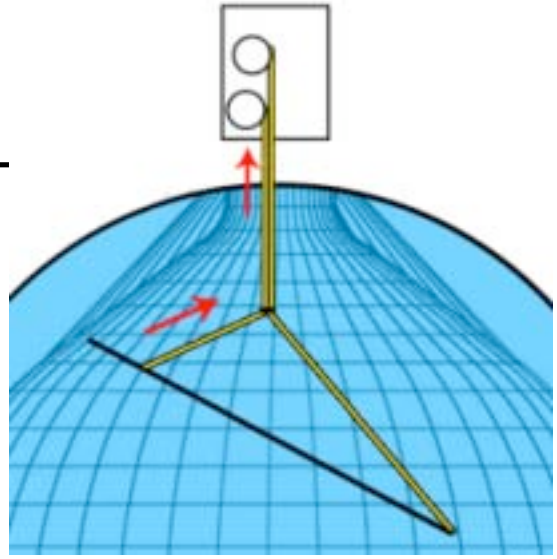


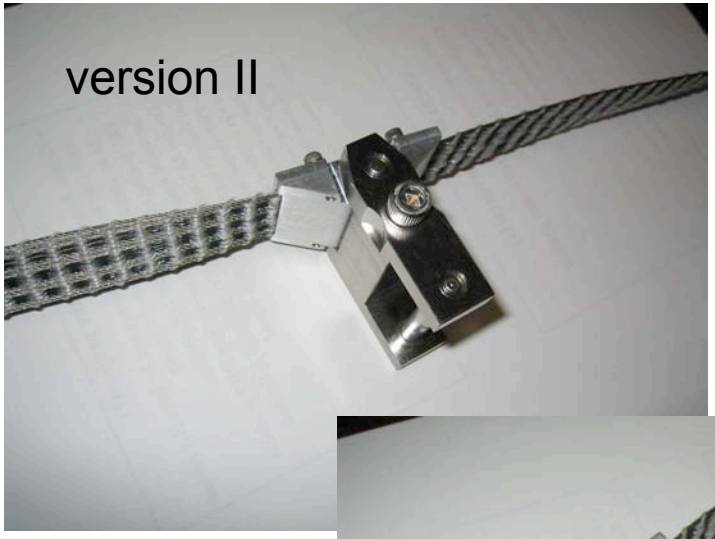




Pivot Block - Revisited

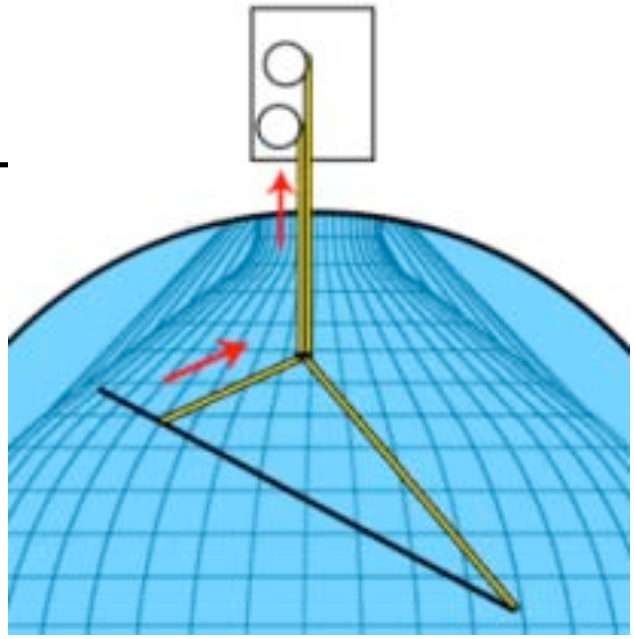
- consists of (1) pivot and (2) clamp
- uses cable clamp, no crimping
- adjustable positioning



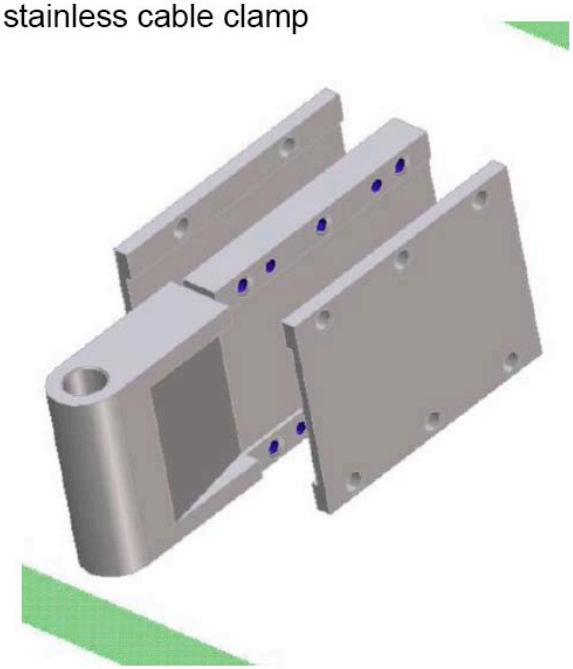


Cable Attachment

- modular
- allows easy replacement of cable
- greater stability and control



stainless cable clamp

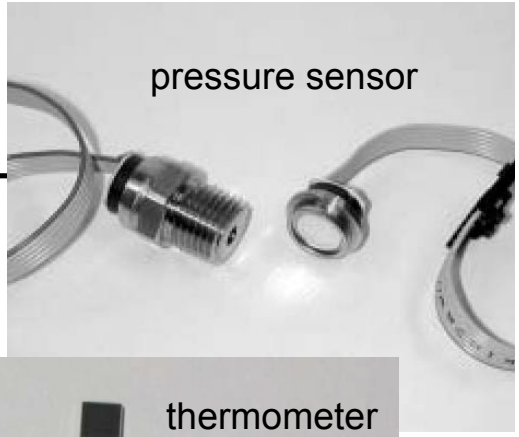


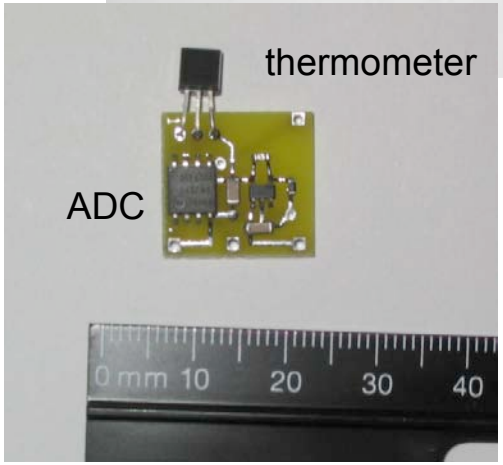
Instrumentation Unit

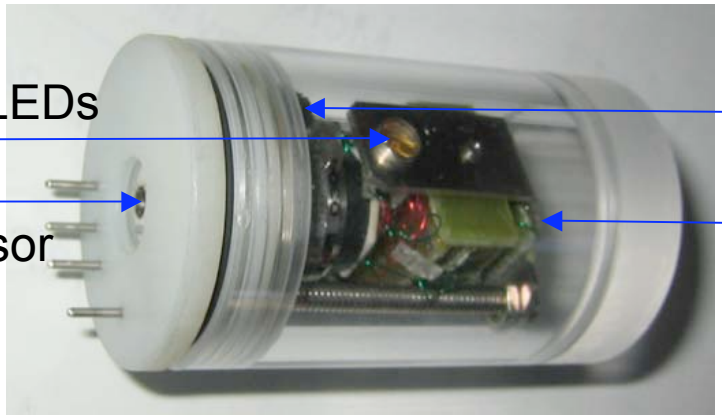
- prototype completely assembled, being tested
- uses total of 3 wires in control cable

-4 functions:

1. reads out pressure sensor
2. controls LEDs
3. measures temperature
4. Inclinometer and accelerometer

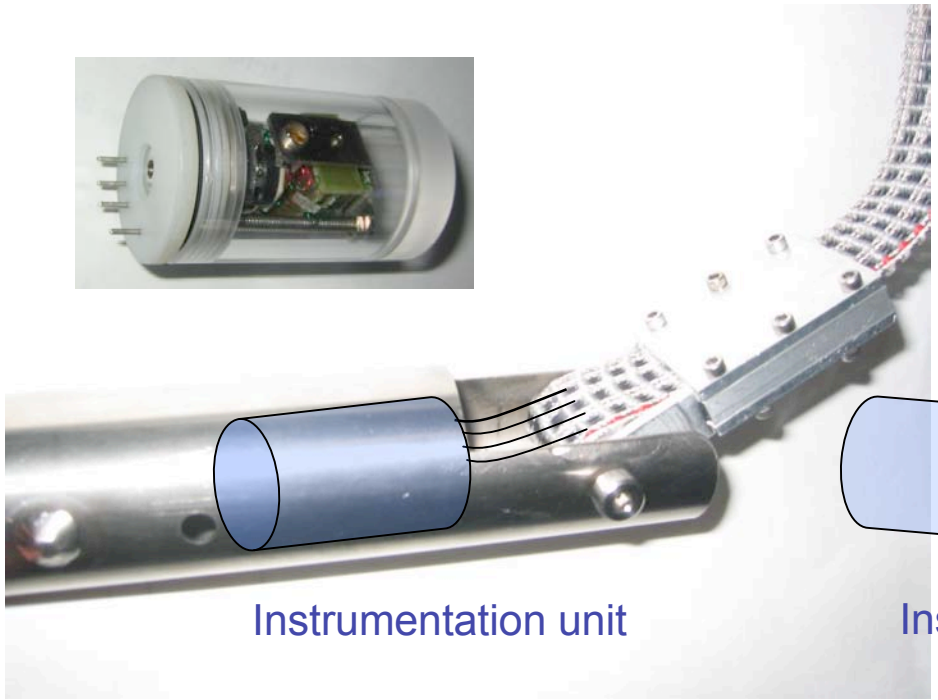




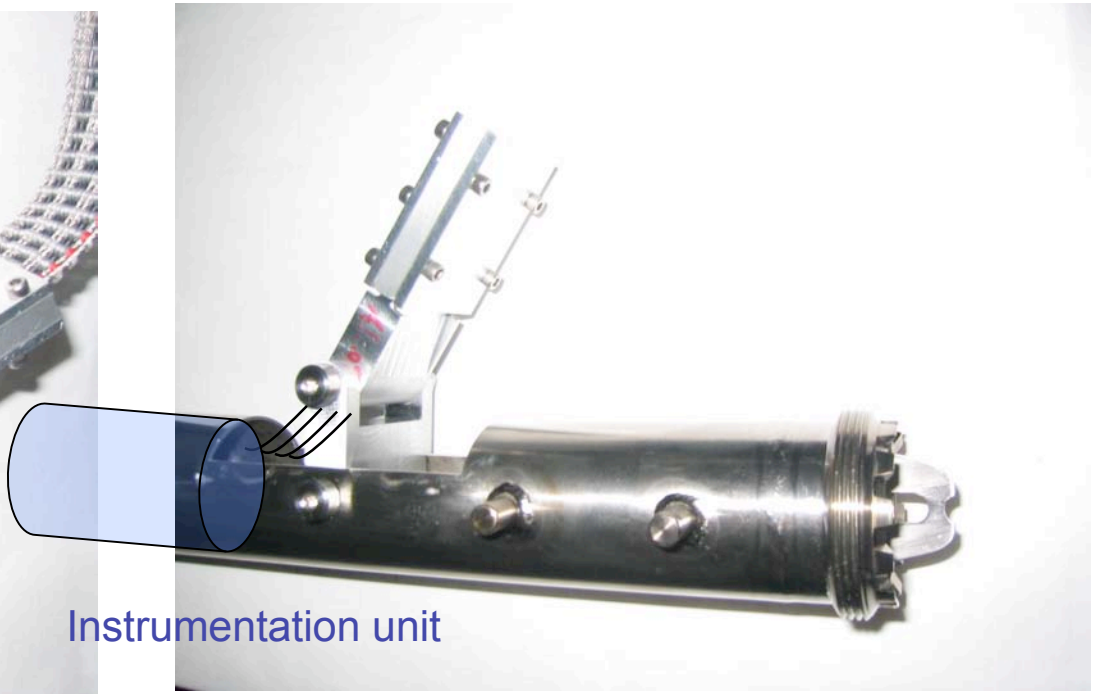


Electrical Connections and Breakout at Cable Ends

Top Cable End

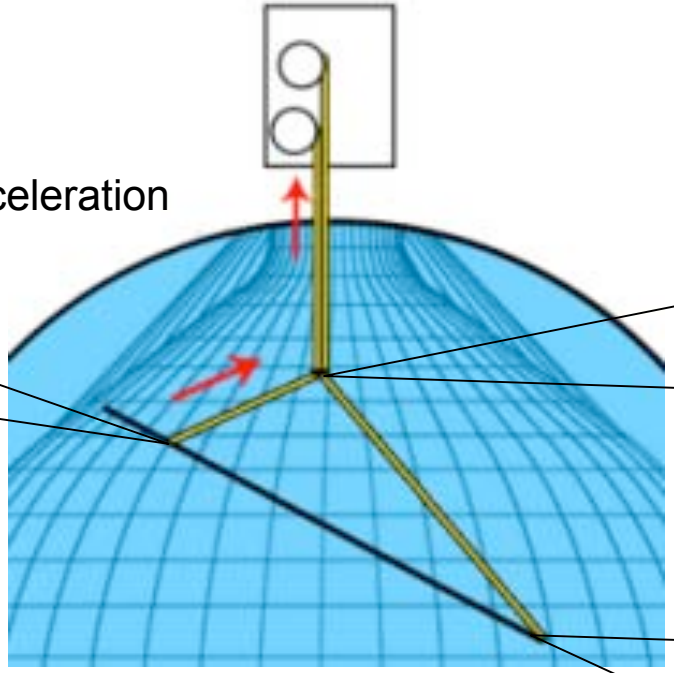


Lower Cable End



Instrumentation of the 4pi System

- temperature
- pressure
- inclination, acceleration
- 830 nm LED



Redundant position information:

1. cable length (encoder pulleys, motor counts) < 0.5 cm
2. depth (3 pressure sensors) < ~1 cm
3. inclination of calibration pole (accelerometers)
4. CCD imaging of IR LEDs